

Hypothyroidism Incidence in Polycystic Ovarian Syndrome/ Subfertility

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ABSTRACT

The association of polycystic ovarian syndrome (PCOS) and hypothyroidism is increasingly being recognised. Both syndromes share some common characteristics. In the patients of these two disorders, sub fertility appears frequently.

Background and Objective: Hypothyroidism and PCOS are those syndromes that affects the women of child bearing age. These syndromes leads to subfertility. Risk of subfertility can be prevented in the patients of hypothyroidism by treatment at the onset of the disease. As hypothyroidism occurs more commonly in the patients of PCOS, so it is very important to explain its clinical impact.

The objective of this study is to find out how hypothyroidism affects the patients who are suffering from polycystic ovarian syndrome.

Study Design: The study design of this article is meta-analysis research.

Material and Method: In last two months, we have studied many patients in our clinic. Out of these patients, some were diagnosed as patients of hypothyroidism and there were some patients of PCOS. All patients were females. Data including age and BMI was noted from their record sheets. We also noted the level of different hormones of their body. Venous blood samples were drawn and thyroid volumes was checked.

Place and Duration: This study is conducted at Gynae and Obs department of Makran Medical College, Turbat and Teaching Hospital Kech, in the last two years in and outdoor from June 2019 to June 2021.

Result: The values of triglycerides, cholesterol, fasting glucose, fasting insulin were significantly higher in the patients of PCOS. Levels of different hormones including FSH, LH, TSH were also different in affected females as compared to control group. Women suffering from PCOS are also unable to conceive. Total thyroid dysfunction was seen in almost 50% patients of PCOS.

Conclusion: Females who were suffering from hypothyroidism had higher volume of their ovaries and cystic ovaries as well. Meanwhile, females who suffered from PCOS had more thyroid related diseases as well. Hypothyroidism changes the level of reproductive hormones in females and makes them unable to conceive (causes subfertility).

Keywords: Hypothyroidism, Subfertility, Insulin resistance, PCOS, BMI, Hormones level.

INTRODUCTION

Polycystic Ovarian Syndrome is hormonal imbalance that is implicated in a number of health issues. Polycystic ovarian syndrome is a disease which affects those women who are going through child bearing age. Women who are suffering from PCOS are unable to ovulate properly. Polycystic ovarian syndrome can also interfere with hypothyroidism. As hormones have ability to reach all parts of the body through blood, so it is possible that imbalance in one set of hormones causes imbalance in other set of hormones.

Researches have found that thyroid diseases are more common in patients who are suffering from polycystic ovarian syndrome [1].

PCOS can occur when the level of androgen (male hormone) are too high in the body. Some women with PCOS have normal level of testosterone in their body. Mostly made up of testosterone, these androgens can wreck havoc on female reproductive system because they interfere with the natural levels of oestrogen and progesterone. In the patients of PCOS, androgen level is so high that it prevents the proper growth of follicular cells.

Diseases related to thyroid occur when thyroid hormones mainly androgen are deficient in the body of patient. Hypothyroidism occurs when there is a lack of thyroid hormones and the thyroid itself decreases in function. Hypothyroidism has a large number of symptoms such as these patients are unable to tolerate cold, they are so lazy, depressed and obese. Those patients who have less than normal amount of iodine in their body can also suffer from hypothyroidism.

There are many causes of hypothyroidism among which most common is Hashimoto's thyroiditis. Diagnosis is made by detecting elevated level of anti thyroid peroxidase antibodies or anti thyroglobulin in the serum in the pre pubertal. It can lead to delayed puberty in adult women. It is considered to be the cause of menstrual disorders and decreased fertility. In hypothyroidism, hormone changes prevent ovulation, leading to polycystic ovaries.

Some studies state that hypothyroidism also causes insulin resistance in the body of patients. As we all know, insulin resistance is the most common symptom of PCOS [2]. Hypothyroidism increases the production of testosterone in the body of females. This testosterone affects menstrual cycle of females. This testosterone makes females unable to ovulate properly [3].

Subfertility is diseases in which females are able to get pregnant but they require more than average time. According to research, couples having 12 months of regular unprotected intercourse are able to conceive. The most common cause of subfertility is a problem with ovulation. As ovulation causes the release of egg, so if ovulation doesn't occur, then there is no egg available for fertilisation. PCOS also prevents ovulation. Some researchers have also shown that females in which thyroid hormones are less than normal are unable to get pregnant.

Hypothyroidism and polycystic ovarian syndrome are those diseases which share some common symptoms. Both disorders are connected with fertility. Sub-fertility is associated with hypothyroidism and PCOS though it seems that in patients with these two diseases, fertility disorder appears more frequently.

Some researchers have also found higher value of BMI and cholesterol in the patients who are suffering from these disorders.

The objective of this study is to find out how hypothyroidism affects the patients who are suffering from polycystic ovarian syndrome.

MATERIAL AND METHOD

In the last two years, we have studied almost 300 patients in and outdoor in Makran medical college, Turbat and teaching hospital kech from June 2019 to June 2021.

Out of these patients, some were diagnosed as patients of hypothyroidism and there were some patients of PCOS. All patients were females.

Verified patients of pcos and hypothyroidism were included in our study. Laboratory examination was done. Data including age and BMI was collected from their record sheets. We took their blood samples. We also noted the levels of different hormones in the bodies of admitted patients. Thyroid volume was checked by using ultrasound machine.

Control group of 50 healthy females was made. **Exclusion Criteria:** Patients who are suffering from diabetic mellitus, thyroid parenchyma, hyperprolactinemia were removed from the study.

Cases with age below 18 were also removed.

Table 1: The comparison of data between patients of pcos and healthy control

Characteristics	Pcos N=70	Control N=50	Difference
Age, year	23.21	22.07	1.11
BMI, kg/m ²	24.07	23.01	1.06
Fasting glucose mg/dL	96.56	87.08	9.48
Fasting insulin IU/mL	15.67	11.23	4.44
HOMA-IR	2.22	1.56	1.14
Total cholesterol, mg/dL	176.54	156.25	20.24
Triglycerides, mg/dL	109.65	88.56	21.09
HDL-C, mg/dL	54.95	53.65	1.44
LDL-C, mg/dL	95.68	83.65	12.03
FSH, m IU/mL	5.22	6.76	1.43
LH, m IU/mL	6.78	5.45	1.24
TSH, u IU/mL	2.02	1.04	1.02
Total thyroid volume	10.13	10.45	0.27

Table 2:

Characteristics	Infertile(+) Pcos(-) n=15	Infertile(-) Pcos(+) N=35	Infertile(+) Pcos(+) N=20	Difference
BMI (kg/m ²)	26.1	24.7	29.5	0.001
FSH (mIU/mL)	7.6	6.7	5.0	0.009
LH (mIU/mL)	4.2	8.9	8.8	0.001
TSH (mIU/mL)	2.6	2.2	2.1	0.776
Insulin (uIU/mL)	12.4	13.5	12.1	0.878
Menstruation problems	60.5	31.5	29.6	0.001

Table 3: Thyroid abnormalities in patients with PCOS

Thyroid abnormalities	Pcos N=70
Goiter	6%
Subclinical hypothyroidism	49%
Overt hypothyroidism	12%
Grave's disease	nil

RESULT

The values of triglycerides, cholesterol, fasting glucose, fasting insulin were significantly higher in the patients of PCOS. Levels of different hormones including FSH, LH, TSH were also different in affected females as compared to control group. Women suffering from pcos are also unable to conceive normally. Total thyroid dysfunction was seen in almost 50% patients of pcos.

DISCUSSION

First of all we will discuss how ovarian morphology becomes polycystic in the presence of hypothyroidism:

Patients who are suffering from hypothyroidism has higher levels of thyroid releasing hormones in their bodies. This hormone increases the production of prolactin in their bodies. Prolactin affects normal ovulatory cycle by changing the levels of follicle stimulating hormone and leutenizing hormone. Fsh and LH are main hormones of menstrual cycle.

Some researchers have found that hypothyroidism causes collagen to get deposited in the ovaries of affected females. Due to deposition of collagen, ovarian morphology got change and become polycystic.[4]

In 2011, Muderris did a research on the patients of hypothyroidism. He found out that females who are suffering from hypothyroidism have ovaries with high volume.[5]

Some researchers states that insulin resistance is present in the patients who have level of thyroid stimulating hormone more than level. [6]

In another study by Ganie et al found out that females who were suffering from thyroiditis were more obese than normal

females. These females also had lesser ovulatory cycles in a year as compared to normal females. [7].

Now we will discuss what are the effects of PCOS on thyroid functions:

Thyroid disorders are present in almost 12% of a population.[8]

Some researchers compared the characteristics of females suffering from PCOS with control group (comprised of healthy females). They found out that females with PCOS had higher chances of goitre. They also rooted out low level of cholesterol in those females. [9]

Another researcher stated that leptin (hormone related with obesity, weight, BMI) was more in patients suffering from hypothyroidism [10].

Another common characteristic of females suffering from PCOS is higher body mass index[11].

Researchers have also observed that People who are obese and have higher body mass index also have higher levels of thyroid stimulating hormone in their bodies.[12]

As we all know obesity is linked with insulin resistance. It leads to decrease in triiodothyronine levels in the body.[13]

Attachment of thyroid stimulating hormone with receptors that are present on the surface of adipocytes causes increase secretion of leptin from it.[14]

Nayak et al stated that there was no relation present between obesity and hypothyroidism.[15]

Another research observed that increased level of thyroid stimulating hormone lessened in the females (who are suffering from pcos and hypothyroidism) when they were treated with metformin [16].

It was also observed that thyroid peroxide antibodies were significantly higher in affected females [17]

Now we will discuss how hypothyroidism causes sub-fertility:

Abnormalities of thyroid affects females by causing anovulation and higher level of prolactin. It also increases the chances of miscarriages in females by changing level of FSH and LH hormones (hormones of menstrual cycle)[18].

Diseases related to thyroid also causes abnormalities in females which are related to reproduction among which more common is sub-fertility .[19]

As we already discussed in primary hypothyroidism, thyroid releasing hormone increases. It leads to increase in prolactin. This prolactin inhibits ovulation, as a result subfertility occurs.

Females suffering from hypothyroidism and also those females were unable to give birth had hyperprolactinemia as well [20,21].

CONCLUSION

Females who were suffering from hypothyroidism had higher volume of their ovaries and cystic ovaries as well. Meanwhile, females who suffered from pcos had more thyroid related diseases as well. Hypothyroidism changes the level of reproductive hormones in females and makes them unable to conceive (causes subfertility).

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